11.—Teichertia in the Plantagenet Beds of Western Australia

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The occurrence of *Teichertia prora* and *Aturia clarkei* in the Plantagenet Beds of Western Australia indicates a Middle Eocene (Lutetian) and possibly an Upper Eocene age for at least part of this unit.

Introduction

Nautiloids are rare in the extensive Tertiary strata of Western Australia, and until recently only a few well-preserved specimens were available for study. However, detailed stratigraphic surveys of all the major sedimentary areas of the State have resulted in the assemblage of useful collections of Tertiary nautiloids from the Giralia-Cardabia Range and the northern end of the Kennedy Range in the Carnarvon Basin, and from the coastal strip to the east of Albany. These pelagic molluscs have proved to be of value in the local correlation of Tertiary strata, although they are of limited worth for detailed studies in absolute chronology.

Early records of Tertiary nautiloids from Western Australia are included in papers by Jutson & Simpson (1916, p.50), Newton (1919), Chapman & Crespin (1934, p. 125), and Condit, Raggatt & Rudd (1936, p. 1059). Later mainly descriptive contributions were made by Miller & Crespin (1939), Teichert (1944), Teichert (*in* Teichert & Glenister, 1952, p. 737-738), Condon (1954, p. 117-120), Glaessner (1955, p. 354-357) and Glenister, Miller & Furnish (1956).

Our knowledge of Tertiary nautiloids is in an advanced state. This conclusion is warranted by the fact that intensive recent studies of extensive faunas from widely spaced geographic areas have resulted in the erection of very few new genera. The discovery of a new genus, *Teichertia* Glenister *et al.* (1956), from the Eocene Giralia and Jubilee Calcarenites of the Carnarvon Basin, was consequently of great interest. Until recently *Teichertia* was known from only 15 specimens collected in the Giralia Range. The present paper records the presence of this genus in the Plantagenet Beds on the Bremer River, some 850 miles S.S.E. of the previous locality.

The authors wish to acknowledge their gratitude to Mr. K. C. C. Tiller of the Perth Technical College who collected the new material on which this paper is based and supplied the necessary stratigraphic and geographic information. Anne Treloar Glenister drew the original of text-figure 2A.

Systematic Palaeontology

Genus **Teichertia** Glenister *et al.*, 1956

Type species.—*Teichertia prora* Glenister *et al.*, 1956, pp. 497-499, pl. 54, fig. 1-8, text-fig. 3B, 4B, 4C.

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This genus was proposed to include a single species from the Eocene of Western Australia. It resembles *Deltoidonautilus*, but differs both in cross-section and sutural contours. In *Teichertia*, the venter is acutely angular rather than narrowly rounded, and the complete suture consists of seven lobes instead of the five developed by *Deltoidonautilus*. The most notable feature of the suture is the unusually high angular ventral saddle.

Teichertia prora Glenister *et al.*, 1956

Deltoidonautilus sp. and *Hercoglossa* sp. **Teichert**, 1952, *J. Paleont.* 26, pp. 737-738; **Condon**, 1954, *Rep. Bur. Miner. Resour. Aust.* No. 15, pp. 117-118.

Teichertia prora **Glenister** *et al.*, 1956, pp. 497-499, pl. 54, fig. 1-8, text-fig. 3B, 4B, 4C.

Description of type material.—This species was originally described from 15 specimens. Most are fragmentary, but together they display the significant morphological features of the species and represent the various ontogenetic stages from 15 mm to 300 mm shell diameter. The smallest available shells are thickly lenticular, but larger specimens develop narrowly compressed whorls, flattened flanks, an acutely angular venter, and a deep impressed zone. The umbilicus is narrow and is almost invariably closed by an umbilical callus. Fine growth lines form broad rounded lateral salients and moderately deep ventral sinuses.

Moderately large specimens develop 20 to 25 septa to the volution. Each suture forms a high subangular ventral saddle and on either side of it a broad rounded lateral lobe and a high rounded lateral saddle. The pair of shallow rounded lobes across the umbilicus are divided by a low umbilical saddle, and are succeeded by an asymmetric internal lateral saddle and a deep narrow dorsal lobe.

The siphuncle is subcentral and has a diameter equal to about a twenticth the height of the corresponding whorl. Septal necks are orthochoanitic and the siphuncle is slightly inflated between adjacent septal foramina.

Additional material.—A single additional specimen (University of Western Australia hypotype 39129) is known from the Bremer River. It is an imperfect internal mould which is preserved in fine-grained siliceous sandstone. Crushing of the specimen is not apparent. The maximum diameter of the conch is estimated to be 70 mm, and about one-third of the ultimate whorl is represented by body chamber. The umbilicus has a diameter of 3½ mm, and it lacks an umbilical plug. The whorl cross-section appears to be almost identical to that of the

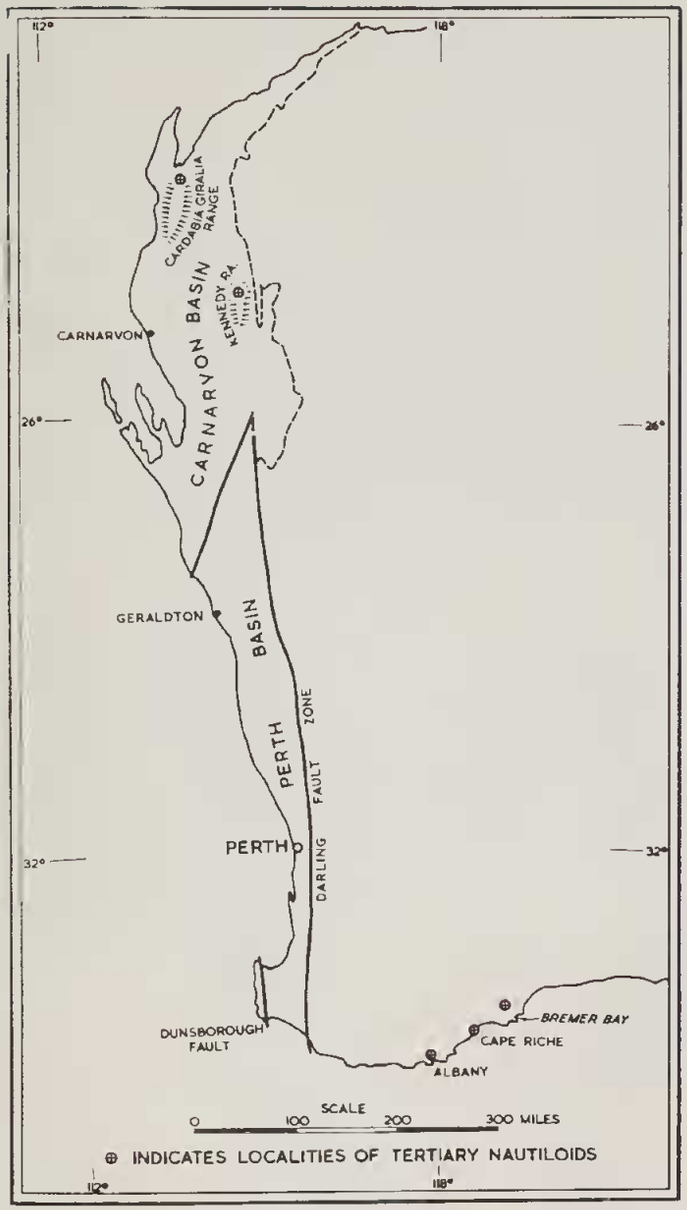

Fig. 1.—Locality map showing western part of Western Australia.

holotype, with an acutely angular venter, flattened flanks, and uniformly rounded umbilical shoulders. Six camerae are present in one-quarter of the ultimate whorl.

Only part of the suture is discernible, but the ventral saddle and part of the lateral lobe are identical with those of similar-sized type specimens.

Occurrence.—Most of the known specimens of this species are from the Giralia Calcarenite and the Jubilee Calcarenite of the Giralia Range, in the north of the Carnarvon Basin. One additional specimen (University of Western Australia hypotype 39129) was collected from an isolated exposure of the Plantagenet Beds in the cliffs which rise from the south bank of the Bremer River, 15½ miles north-west of John Cove in Bremer Bay and ¾ mile east of the Dog-Proof Fence. It was associated with a large but poorly preserved fauna of Foraminifera, sponge spicules, corals, bryozoans, brachiopods, worms, gastropods, pelecypods and scaphopods. All occurrences of the species are thought to be of Middle or possibly Upper Eocene age.

Repository.—Holotype 1700, figured paratypes 1701-1703, and unfigured paratypes 1704 and 1708 are lodged with the Commonwealth of Australia Bureau of Mineral Resources, and hypotype 39129 is housed in the Department of Geology, University of Western Australia.

Stratigraphic Implications

A recent general account of the stratigraphy of Western Australia is available in McWhae *et al.* (1958). The Plantagenet Beds are exposed sporadically for about 400 miles along the south coastal strip of Western Australia, from Nornalup Inlet to the Great Australian Bight. Sections up to 300 feet thick have been measured (Clarke & Phillipps, 1954), but nowhere have the strata been subjected to detailed mapping and extensive palaeontological studies. The unit had long been considered to be of Lower Miocene age (Chapman & Crespin, 1934, p. 127). However, Glaessner (1953, p. 143) suggested that the Plantagenet Beds of Western Australia, with *Aturia clarkei* Teichert and a rich fauna of sponges are probably about the same age as the late Eocene marine strata of south-eastern Australia. In a later paper Glaessner (1955, p. 357) indicated that, in South Australia, *Aturia clarkei attenuata* is restricted to the Tortachilla Limestone and its equivalents. This formation lies beneath the "transitional" member of the Blanche Point Marl, in which *Hantkenina alabamensis compressa* and other distinctive Upper Eocene Foraminifera are found. The other subspecies, *Aturia clarkei clarkei*, occurs above the "transitional" member in the "Banded Marl member" of the Blanche Point Marl of South Australia, about 40 feet above the Tortachilla Limestone. Glaessner attributed chronological importance to the relative stratigraphic positions of the two subspecies, although they were both considered to be of Upper Eocene age; the same age was indicated for strata with *Aturia clarkei* in the Plantagenet Beds. However, the range of *Aturia clarkei* probably extends down into the Middle Eocene, as this species has been recorded doubtfully from near the base of the Giralia Calcarenite (Glenister *et al.* 1956, p. 502).

It is doubtful whether there is any chronological significance in the relative stratigraphic positions of the two subspecies of *Aturia clarkei*, as both morphological types occur together in the thin Merlinleigh Sandstone of Western Australia. Glenister is at present assembling a collection to test the possibility that the two "subspecies" of *A. clarkei* are ontogenetic stages of the one species.

The known specimens of *Teichertia prora* from the Carnarvon Basin were collected from near the top of the Jubilee Calcarenite and the overlying basal beds of the Giralia Calcarenite. *Aturia* cf. *A. clarkei* is associated with the species near the base of the Giralia Calcarenite (Glenister *et al.*, 1956, p. 502). Dr. R. O. Brunnschweiler has studied the brachiopods, gastropods, pelecypods and echinoids of the two formations, and he considers both to be "Middle Eocene, mainly Lutetian" (writ. comm., 1/6/55). Dr H. S. Edgell's foraminiferal studies (writ. comm., 1/8/56) also indicate that both formations should be referred to the Lutetian. The possibility of a slightly younger age for at least part

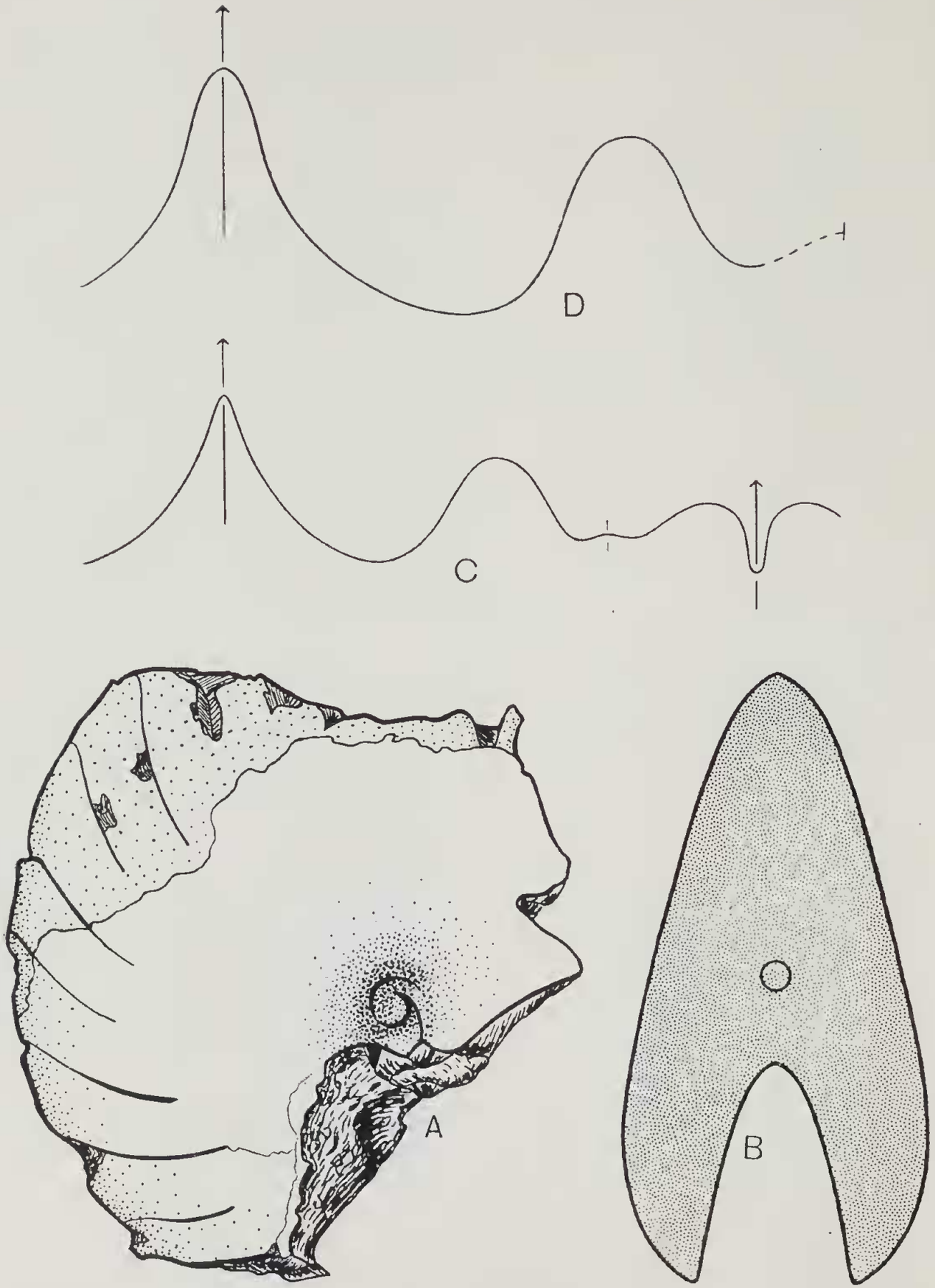

Fig. 2.—*Teichertia prora* from the Eocene of Western Australia. (A) hypotype 39129, from the Plantagenet Beds on the Bremer River, x 2; (B) cross-section of holotype 1700, from the Giralia Calcarenite of the Giralia Range, x 1¾; (C) suture of holotype at conch height of 55 mm; (D) suture of paratype 1703, from the Giralia Calcarenite of the Giralia Range at conch height of 165 mm. (B-D) after Glenister *et al.* (1956).

of the Giralia Calcarenite is suggested in foraminiferal studies by Crespin (*in* Crespin *et al.*, 1956, p. 6), who considers that "The species recognised indicate chiefly an upper Eocene age, but some of the limestones may be equivalent to 'a-b' stage of the Indo-Pacific 'letter' classification; that is, middle to upper Eocene." *Teichertia* is not known to occur above the basal beds of the Giralia Calcarenite, and so a Middle Eocene (Lutetian) age for the containing beds seems probable, although the possibility that they are Upper Eocene cannot be eliminated.

Aturia clarkei occurs in large numbers in the Merlinleigh Sandstone of the Kennedy Range. Dr. R. O. Brunnschweiler (writ. comm. 1/6/55) has studied an extensive collection of pelecypods gastropods, and echinoids from the formation, and believes that they are of Lutetian age. *Aturia clarkei* also suggests the correlation of the Merlinleigh Sandstone with the basal beds of the Giralia Calcarenite.

In conclusion, it is almost certain that at least parts of the Plantagenet Beds are of Eocene age. The cephalopods *Teichertia prora* and *Aturia clarkei* suggest correlation of the Plantagenet Beds with the Middle and possibly Upper Eocene Giralia Calcarenite and Jubilee Calcarenite of the Giralia Range and the Middle Eocene Merlinleigh Sandstone of the Kennedy Range. *Aturia clarkei* is known from the Upper Eocene of South Australia, although it could range down into the Middle Eocene in that area. Consequently, the age of the nautiloid-bearing strata of the Plantagenet Beds can be given as Middle Eocene (Lutetian) or possible Upper Eocene.

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